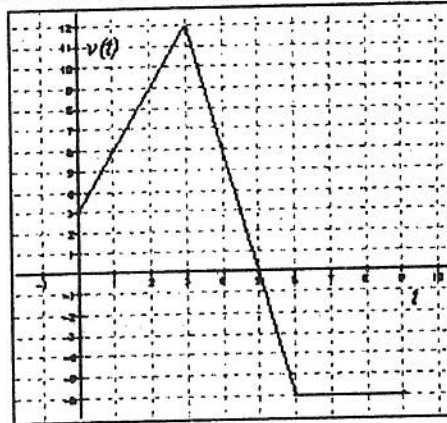


Curriculum Module: Calculus: Motion

Example 1 (graphical)

The graph below represents the velocity v , in feet per second, of a particle moving along the x -axis over the time interval from $t = 0$ to $t = 9$ seconds.

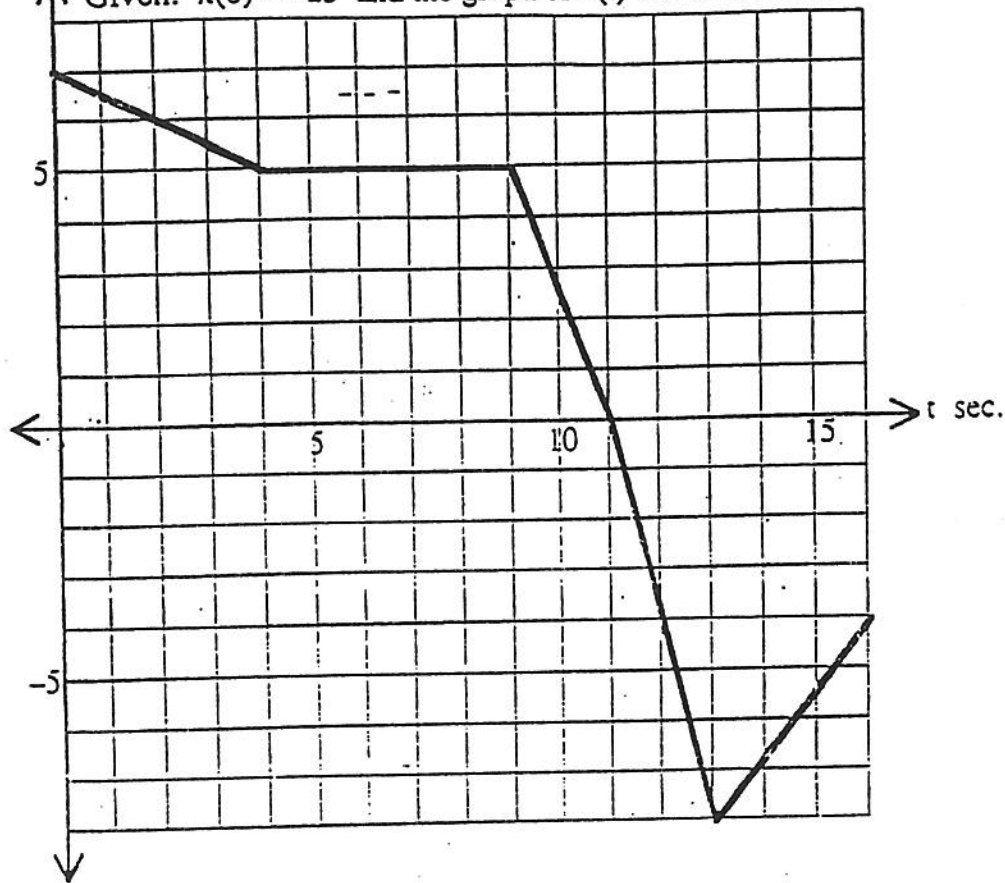


1. At $t = 4$ seconds, is the particle moving to the right or left? Explain your answer.
2. Over what time interval is the particle moving to the left? Explain your answer.
3. At $t = 4$ seconds, is the acceleration of the particle positive or negative? Explain your answer.
4. What is the average acceleration of the particle over the interval $2 \leq t \leq 4$? Show the computations that lead to your answer and indicate units of measure.
5. Is there guaranteed to be a time t in the interval $2 \leq t \leq 4$ such that $v'(t) = -3/2$ ft/sec²? Justify your answer.
6. At what time t in the given interval is the particle farthest to the right? Explain your answer.

Example 2 (graphical)

v ft/s

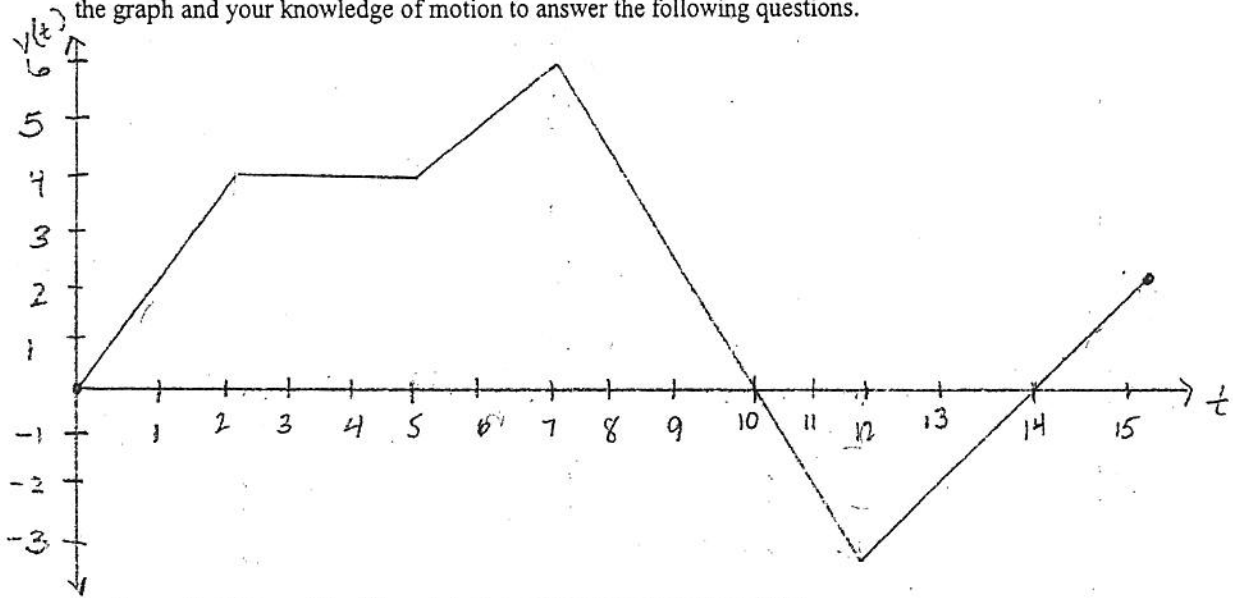
Given: $x(0) = -25$ and the graph of $v(t)$ for $0 \leq t \leq 16$.



- (1) Does the particle begin moving right or left? _____
- (2) When is the particle at rest? _____
- (3) What is the maximum velocity? _____
- (4) What is the maximum speed of the particle? _____
- (5) When is the particle moving to the left? _____
- (6) How far to the right does the particle get? _____
- (7) How far does the particle travel? _____
- (8) What is the particle's finishing position? _____
- (9) On what interval is the particle speeding up? _____

Example 3 (graphical)

The graph shown below shows the velocity, $v(t)$, of a particle moving along the x-axis for $0 \leq t \leq 15$. Use the graph and your knowledge of motion to answer the following questions.



1. Over what interval(s) of time, t , is the particle moving to the right?
2. At which time(s) is the particle at rest?
3. Over what time interval(s) is the speed decreasing? Explain your answer.
4. Find the total distance traveled by the particle over the time interval $0 \leq t \leq 15$.
5. Find the total displacement of the particle over the time interval $0 \leq t \leq 15$.
6. If the initial position of the particle is $x(0) = 5$, find the position of the particle at time $t = 15$.